

Claims

[c1] 1. An earphone detection device suitable for use in detecting a plug/unplug status of an earphone from an earphone driving circuit that has a detection terminal, the earphone detection device comprising:
a transistor having a first terminal, a second terminal, a third terminal and a fourth terminal, wherein the first terminal and the fourth terminal are electrically connected and both electrically connected to an operating voltage; a first resistor having a first terminal and a second terminal, wherein the first terminal is electrically connected to the first terminal of the transistor and the second terminal is electrically connected to the second terminal of the transistor;
a second resistor having a first terminal and a second terminal, wherein the first terminal is electrically connected to the third terminal of the transistor and the second terminal is electrically connected to a ground terminal;
a capacitor having a first terminal electrically connected to the second terminal of the transistor and a second terminal electrically connected to the ground terminal;
a third resistor having a first terminal and a second terminal, wherein the first terminal is electrically connected to the second terminal of the transistor and the second terminal electrically connected to the detection terminal; and a detector electrically connected to the third terminal of the transistor.

[c2] 2. The earphone detection device of claim 1, wherein the transistor includes a p-channel metal-oxide-semiconductor field effect transistor (p-channel MOSFET).

[c3] 3. The earphone detection device of claim 2, wherein the first terminal is a source terminal, the second terminal is a gate terminal, the third terminal is a drain terminal and the fourth terminal is a substrate terminal.

[c4] 4. An earphone detection device suitable for use in detecting a connection status of an earphone to a driving circuit, the earphone detection device comprising:
a transistor having a first terminal, a second terminal, a third terminal and a

fourth terminal, wherein the first terminal and the fourth terminal are electrically connected to an operating voltage and the third terminal is electrically connected to a ground terminal;

a first resistor having a first terminal and a second terminal, wherein the first terminal is electrically connected to the first terminal of the transistor and the second terminal is electrically connected to the second terminal of the transistor;

a second resistor having a first terminal and a second terminal, wherein the first terminal is electrically connected to the third terminal of the transistor and the second terminal is electrically connected to the ground terminal;

a third resistor having a first terminal and a second terminal, wherein the first terminal is electrically connected to the second terminal of the transistor and the second terminal is electrically connected to a detection terminal of the driving circuit; and

a detector electrically connected to the third terminal of the transistor.

[c5] 5. The earphone detection device of claim 4, wherein the transistor includes a p-channel metal-oxide-semiconductor field effect transistor (p-channel MOSFET).

[c6] 6. The earphone detection device of claim 5, wherein the first terminal is a source terminal, the second terminal is a gate terminal, the third terminal is a drain terminal and the fourth terminal is a substrate terminal.

[c7] 7. A connection detecting device with a detection circuit for detecting a connection status of an earphone to an earphone driving circuit, the earphone driving circuit having a detection terminal, the connection detecting device comprising:

a transistor having a first terminal, a second terminal, a third terminal and a fourth terminal, wherein the first terminal and the fourth terminal are electrically connected to an operating voltage and the third terminal is electrically connected to a ground terminal;

a first resistor having a first terminal and a second terminal, wherein the first terminal is electrically connected to the first terminal of the transistor and the

second terminal is electrically connected to the second terminal of the transistor;
a second resistor having a first terminal and a second terminal, wherein the first terminal is electrically connected the third terminal of the transistor and the second terminal is electrically connected to the ground terminal;
a third resistor having a first terminal and a second terminal, wherein the first terminal is electrically connected to the second terminal of the transistor and the second terminal is electrically connected to the detection terminal; and
a detector electrically connected to the third terminal of the transistor;
wherein the first resistor has a resistance considerably greater than the resistance of the second resistor.

[c8] 8. The connection detecting device of claim 7, further including a capacitor that has a first terminal and a second terminal such that the first terminal of the capacitor is electrically connected to the second terminal of the transistor and the second terminal of the capacitor is electrically connected to the ground terminal.

[c9] 9. The connection detecting device of claim 8, wherein the transistor includes a p-channel metal-oxide-semiconductor field effect transistor (p-channel MOSFET).

[c10] 10. The connection detecting device of claim 9, wherein the first terminal is a source terminal, the second terminal is a gate terminal, the third terminal is a drain terminal and the fourth terminal is a substrate terminal.

[c11] 11. The connection detecting device of claim 7, wherein the transistor includes a p-channel metal-oxide-semiconductor field effect transistor (p-channel MOSFET).

[c12] 12. The connection detecting device of claim 11, wherein the first terminal is a source terminal, the second terminal is a gate terminal, the third terminal is a drain terminal and the fourth terminal is a substrate terminal.